

# Reference Manual



# BMW PANORAMA GLASS SUNROOF



## Technical Training

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# **BMW Panorama Glass Sunroof**

**Model: E53, E83, E61, E91, and E70**

**Production: From Start of Production**

# **OBJECTIVES**

After completion of this module you will be able to:

- Understand and be able to explain the Panorama Glass Sunroof
- Initialize the Panorama Glass Sunroof

## Introduction

A number of control units participate in the operation of the panorama glass sunroof. The roof function center controls and monitors the motor of the panorama glass sunroof.

The roof function center (FZD) is, for example, linked with the Car Access System CAS 3, which enables or disables operation of the panorama glass sunroof.

The footwell module FRM supplies the signal from the door contacts. The junction box control unit provides the power supply for the motors via the terminal 30g relay.

The Dynamic Stability Control provides the road speed signal.

### Operating Concept

The panorama glass sunroof operating button has three directions of movement. In addition to the manual and overpress functions, the button has a double-click function into the three movement directions.

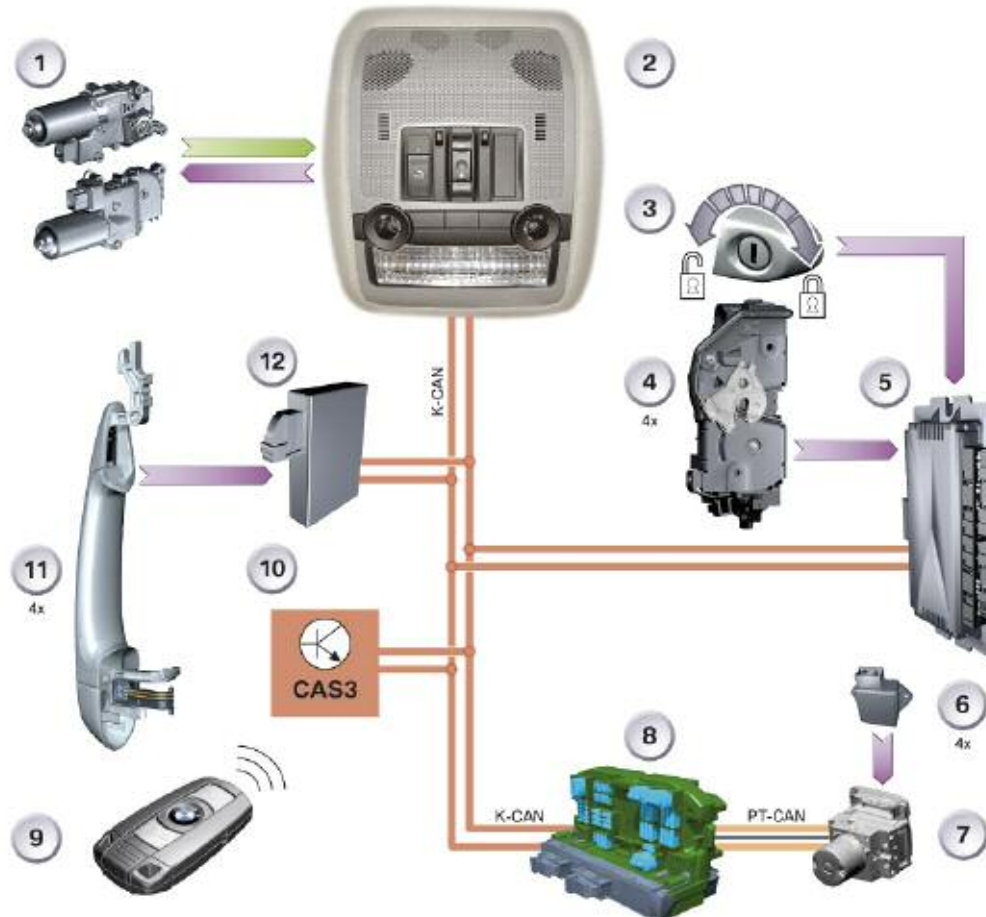
In the double-click function the button is actuated twice within a short time into the overpress position or tilt position.

This allows the customer to have the panorama glass sunroof opened and closed automatically from any position of the sunroof and its blind.

When the panorama glass sunroof is in motion, its movement can be stopped by operating the button again.

# System Overview

## Inputs/Outputs

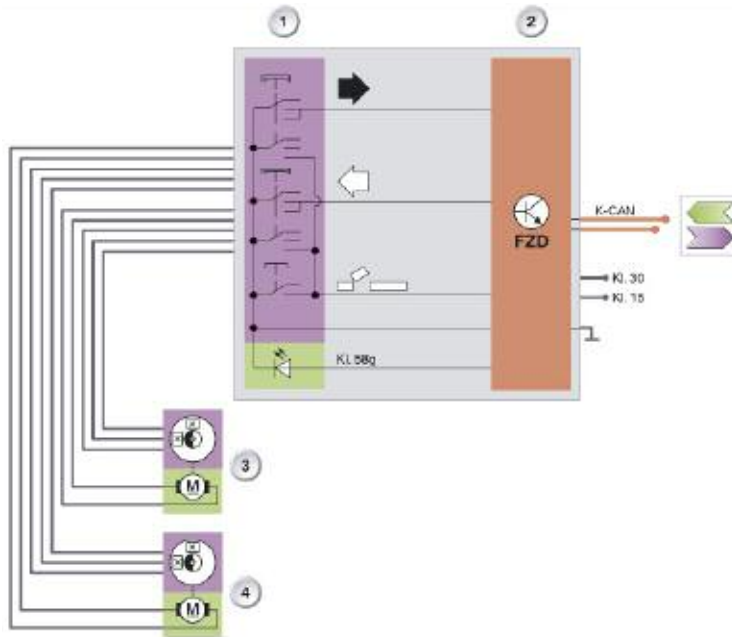


Index	Explanation	Index	Explanation
1	Panorama glass sunroof motors	8	Junction Box control unit JB
2	Roof function center	9	Identification transmitter
3	Driver's door lock cylinder	10	Car Access System 3 CAS 3
4	Door contacts (4x) in the vehicle doors	11	Driver's side and passenger side outside door handles
5	Footwell module FRM	12	Comfort Access
6	DSC sensor	K-CAN	Body CAN
7	Dynamic stability control	PT-CAN	Powertrain CAN

The button in the roof function center (2) is used to open, close and tilt the panorama glass sunroof.

The roof function center controls and monitors the operation of the motors (1) for the panorama glass sunroof.

## System Circuit Diagram



Index	Explanation
1	Button for panorama glass sunroof
2	Roof function center FZD
3	Motor, panorama glass sunroof
4	Motor, panorama glass sunroof
K-CAN	Body CAN
Kl. 15	Terminal 15
Kl. 30	Terminal 30
Kl. 58g	Terminal 58 switched

K-CAN signals at the roof function center			
In/out	Information	Source/sink	Function
In	Vehicle speed	Rotational speed sensor > Dynamic Stability Control	Release the wind deflector
In	Outside temperature	Outside temperature sensor > instrument cluster	Value used in determining the thermal protection for the panorama glass sunroof motors
In	Panorama glass sunroof release	Car Access System 3 > roof function center	Release signal for operation of the panorama glass sunroof
In	Terminal 50 status	Car Access System 3 > roof function center	Interruption of the adjustment procedure for the panorama glass sunroof
In	Comfort opening	Identification sensor/remote control > Car Access System 3	Comfort opening of the panorama glass sunroof
In	Comfort opening	Driver's door lock cylinder > footwell module	Comfort opening of the panorama glass sunroof
In	Comfort closing	Identification sensor/remote control > Car Access System 3	Comfort closing of the panorama glass sunroof
In	Comfort closing	Driver's door lock cylinder > footwell module	Comfort closing of the panorama glass sunroof
In	Comfort closing	Outside door handle > Comfort Access	Comfort closing of the panorama glass sunroof
Out	Anti-trapping protection deactivated	Roof function center > instrument cluster	Anti-trapping protection function indicator deactivated



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Comfort opening and comfort closing can be operated from the identification transmitter/remote control or via the lock cylinder in the driver's door. This is done by holding down the locking/unlocking button until the panorama glass sunroof is closed/opened.

The lock cylinder operates in a similar fashion. The mechanical key must be held in the locking/unlocking position until the panorama glass sunroof is closed/opened.

The panorama glass sunroof can be closed by touching the sensitive area on the outside door handle. The sensitive area must be touched until the panorama glass sunroof is closed.

# System Components

The panorama glass sunroof in the [car] comprises mechanical and electrical components.

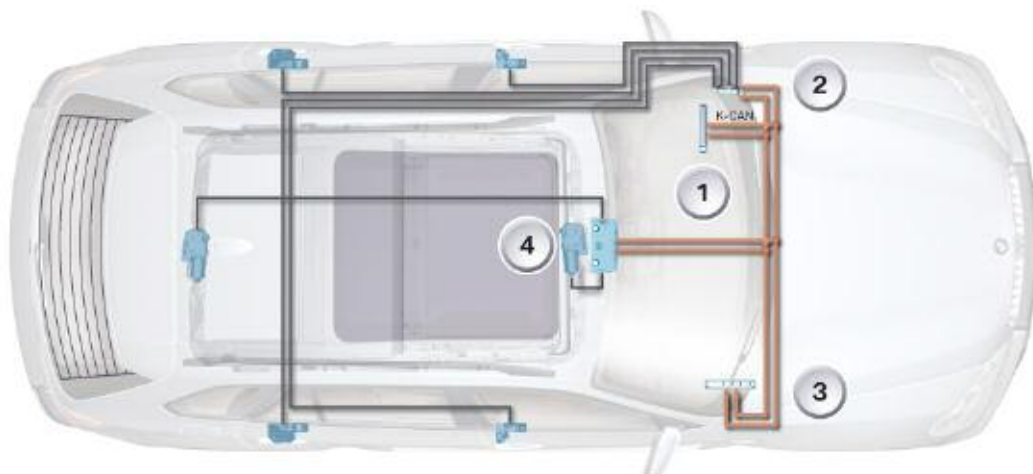
## Mechanical Components

- Glass roofs
- Blind
- Panorama glass sunroof cassette
- Wind deflector

## Electrical Components

- Button
- Control units
  - Car Access System 3
  - Footwell module
  - Roof function center
- Panorama glass sunroof motors.

The following graphic shows all the electrical components of the panorama glass sunroof system together with the appropriate control units and control elements.



Index	Explanation	Index	Explanation
1	Car Access System 3	3	Junction box control unit
2	Footwell module	4	Roof function center

---

## Control Units

### Car Access System 3

The Car Access System 3 issues the release signal for the panorama glass sunroof.

Movement is prevented during the engine starting phase by sending the "Terminal 50 ON" status. This means that there is more energy available from the battery for the starter to start the engine.

### Footwell Module

The footwell module makes available the status of the door contacts and the driver's door lock cylinder.

The footwell module also supplies the roof function center with information concerning the "Terminal 58g ON" status.

### Roof Function Center

The roof function center contains the complete functions of the panorama glass sunroof. The roof function center is always

installed in connection with the panorama glass sunroof.

The relays required to drive the panorama glass sunroof motors are integrated in the roof function center.

### Panorama Glass Sunroof Motor

One motor for the panorama glass sunroof has two Hall sensors.

The Hall sensors are located on the motor shaft and are offset against one another by 90°.

When the motor is running, this results in two temporally offset Hall signals that are used to register the direction of rotation of the motor and for the anti-trapping protection function.

The motor is new, but functionally identical to its predecessors. The visible difference is that its casing is made of plastic.

**Note: Two motors are fitted to move the panorama glass sunroof.**

## Principles of Operation

The roof function center receives signals from the other control units for the functions of the panorama glass sunroof.

The executing control unit is the roof function center. It controls the panorama glass sunroof motor on demand and at the same time monitors the motor's rotation.

The following functions of the panorama glass sunroof are built in the roof function center:

- Reading operation requests
- Controlling the panorama glass sunroof motors
- Opening/closing the panorama glass sunroof and blind
- Anti-trapping protection function
- Blocking protection
- Panic mode
- Load cut-out during start procedure
- Terminal 58g
- Initialization



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## Reading Operation Requests

Panorama glass sunroof operation may be requested through the following controls:

- Panorama glass sunroof button
- Remote control/identification transmitter
- Driver's door lock cylinder
- Outside door handle in Comfort Access

### **Panorama Glass Sunroof Button**

The button for the panorama glass sunroof is located in the roof function center.

When operated, the button sends a low signal to the electronic module that drives the panorama glass sunroof motor corresponding to the button selection.

The LED (locating lamp) of the button in the roof function center is supplied from the "Terminal 58g ON" terminal status.

### **Remote Control/Identification Transmitter**

The convenient opening/closing function is initiated by pressing the button on the remote control/identification transmitter.

### **Driver's Door Lock Cylinder**

The convenient opening/closing function is triggered by turning and holding the mechanical key or the spare key in the open/close position in the driver's door lock barrel.

### **Outside Door Handle**

Comfort closing can only be triggered using the outside door handle with Comfort Access.

The sensitive area must be touched for a long time to launch the comfort closing process.

Only then will the roof function center execute the comfort closing. Releasing the sensitive area interrupts the comfort closing.

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## Motor Control

When the roof function center receives a request for the panorama glass sunroof, it controls the integrated relay. The panorama glass sunroof motor is supplied with power through the relay.

The relay contacts are monitored by the roof function center to ensure that perfect control of the motor and the panorama glass sunroof is achieved. In addition, the motor speed is calculated and the direction of the motor's rotation is detected from the pulses of the Hall sensors.

The distance the panorama glass sunroof must cover during the opening or closing procedure is defined in the roof function center. The panorama glass sunroof motor generates a certain number of pulses within this distance and therefore recognizes the end positions of the panorama glass sunroof.

## Anti-Trapping

Both the glass roofs and the floating blinds are equipped with an indirect anti-trapping protection function. The indirect anti-trapping protection function operates on the basis of the power consumption of the panorama glass sunroof motor.

If the roof function center detects a trapping situation, the corresponding motor is stopped and controlled in the opposite direction. This opens the glass roof or blind again (approximately 20 cm) and releases the obstruction.

## Blocking Protection

If the pulses from the Hall sensors drop out for more than 500 ms during an opening or closing operation, the roof function center detects a blockage.

The power supply to the motor is switched off.

## Thermal Protection

The thermal protection for the panorama glass sunroof motor is calculated in the roof function center. To this end, a temperature sensor is mounted on the board in the roof function center to measure the ambient temperature.

The roof function center calculates the current temperature of the motor by applying the running time of the panorama glass sunroof motor.

The warm-up and cool-down periods are stored in a temperature model in the roof function center.

The current temperature is stored in the memory before the roof function center passes into sleep mode. The motor temperature is made equal to the ambient temperature when the vehicle is started again.

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## **Panic Mode**

The panorama glass sunroof is closed with maximum closing force in panic mode. Panic mode is triggered by pressing and holding, reversing, releasing and pressing and holding the panorama glass sunroof button again.

A valid release signal from Car Access System 3 is the precondition for the execution of the emergency closing function.

It is necessary to release and press the button again, as the first time the button is pressed the anti-trapping protection function is still active. The panorama glass sunroof closes with maximum force as a result of the second press within a short time.

It is possible to activate panic mode up to a vehicle speed of 16 km/h. Panic mode can be activated from both the tilt position (approximately 100 ms) and from the open position (approximately 1 s).

## **Load Deactivation**

Operation of the panorama glass sunroof is aborted/interrupted during the vehicle start procedure. Operation of the panorama glass sunroof can resume on completion of the starting procedure.

The Car Access System 3 retracts the release signal to operate the panorama glass sunroof during the vehicle starting procedure. The Car Access System 3 issues the release signal again on completion of the starting procedure.

## **Terminal 58g**

When the exterior lights are switched on, the footwell module sends this information via the K-CAN.

The roof function center receives this information and adopts the set value for the instrument lighting.

The LED in the button for the panorama glass sunroof is controlled by a pulse-width modulated signal from the roof function center. This achieves a constant brightness of the LED even under fluctuating system voltage conditions.

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## Opening/Closing the Panorama Glass Sunroof

The button can be moved to two engaged positions in the opening and closing directions. In the first engaged position, a movement is initiated which is only executed for as long as the button is being pressed.

Control functions

- Opening blind only
- Opening blind and glass roof (to comfort position)
- Glass roof tilt position and blind ventilation position
- Closing glass roof only
- Closing glass roof and blind
- Closing blind only with glass roofs already closed.

All control functions are also available as one touch control functions (comfort functions).

The one-touch control function is reached by pressing the button again to the second engaged position in the direction required for the panorama glass sunroof.

The one-touch control function provides automatic opening or closing of the panorama glass sunroofs.

### Directions of Movement

Initial state: Both glass roofs and both blinds closed.

### Opening Blinds

Press "OPEN" 1 x

- Signal from switch to roof function center
- The roof function center controls the rear motor as long as the button is pressed or until the blind is fully opened.
- Rear motor opens both blinds
- The glass roofs remain closed



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### **Opening Blinds (one-touch control function)**

Press "OPEN" 1 x

- Signal from switch to roof function center
- Roof function center activates rear motor
- Rear motor opens both blinds
- The glass roofs remain closed

### **Opening Blinds and Glass Roof**

Press "OPEN" 2 x (double-click function)

- Signal from switch to roof function center
- Roof function center first activates the rear motor
- Rear motor opens both blinds
- The roof function center controls the front motor after a time, from a short distance from the blind.
- Front motor opens front glass roof
- Rear motor raises wind deflector

### **Tilt Position**

Press "TILT" 1 x

- Signal from switch to control unit
- Roof function center activates both motors
- Front motor tilts both glass roofs
- Rear motor moves both blinds forwards into the gap position (ventilation position).

### **Closing Glass Roofs**

Press "CLOSE" 1 x

- Signal from switch to roof function center
- The roof function center controls the front motor as long as the button is pressed or until the glass roofs are fully closed.
- Front motor closes both glass roofs

### **Closing the Glass Roofs (one-touch control function)**

Press "CLOSE" 1 x past the first stop

- Signal from switch to roof function center
- Roof function center activates front motor
- Front motor closes both glass roofs

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## Closing Glass Roofs and Blind

Press "CLOSE" 2 x (double-click function)

- Signal from switch to roof function center
- Roof function center first activates the front motor
- Front motor closes both glass roofs
- The roof function center controls the rear motor after a time, from a short distance from the glass roof.
- Rear motor closes both blinds and releases the wind deflector so that the glass roof can press it down.

## Closing the Blinds

(only possible if glass roofs are already closed)

Press "CLOSE" 1 x

- Signal from switch to roof function center
- Roof function center activates rear motor
- Rear motor closes both blinds

## ■ Wind Deflector with Roof Open

The roof function center receives a speed signal from the Dynamic Stability Control.

The roof function center controls the rear motor to release the wind deflector from a road speed of 180 km/h. Consequently, the wind deflector is depressed into a lower position.

**Note: The motor only runs lightly, the blinds do not move.**

## Comfort Opening

The panorama glass sunroof can be opened by extended actuation of the unlock button with the remote control/identification sensor or with the mechanical key in the open direction.

**Note: The movement of the window risers must be completed before comfort opening of the panorama glass sunroof can start.**

## Comfort Closing

The panorama glass sunroof can be closed by extended actuation of the lock button with the remote control/identification sensor or with the mechanical key in the close direction.

If the vehicle is equipped with Comfort Access, comfort closing can be started by touching the sensitive outside surface.

# Service Information

## Initialization

Initialization of the panorama glass sunroof involves the following procedures that are necessary to ensure complete operation of the panorama glass sunroof:

- Normalization  
Normalization means locating the mechanical end position at the stop for the tilt position. This position is stored and is used in calculating the remaining end positions for the panorama glass sunroof.
- Learning the characteristic curve  
The learning procedure registers the closing force necessary for each direction of the panorama glass sunroof and stores this value.

Complete functionality of the panorama glass sunroof can be guaranteed only by full initialization.

The initialization procedure can be initiated with the button for the panorama glass sunroof or via the diagnosis system.

### Initialization with the Button

Initialization is performed as follows:

- Press and hold control button in sunroof tilt direction Move both glass roofs into the tilt position and both blinds into the ventilation position
- After approximately 15 seconds the initialization run starts in the tilt direction and stores the end position
- The panorama glass sunroof is closed after 5 seconds in the tilt position
- The panorama glass sunroof is then opened and the end position stored.

**Note: The control button must remain pressed during the entire initialization procedure. The initialization procedure must be repeated if the button is released.**

**Initialization takes approximately 120 seconds.**

---

## **Interruption in Power Supply**

An interruption in the power supply does not require a new normalization. The initialization is invalidated if the power supply is interrupted during the initialization or during operation. A new initialization will then be necessary.

### **Clearing the Initialization**

Initialization is cleared under the following circumstances:

- Failure of the power supply during initialization
- Hall sensor fault detected
- Position implausible
- Certain calls in the diagnostics
- Changed vehicle coding
- Coding data faulty

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# **BMW Panorama Glass Sunroof Disassembly**

**Model: E53, E83, E61, E91, and E70**

**Production: From Start of Production**

# **OBJECTIVES**

After completion of this module you will be able to:

- Identify the components of Panorama Glass Sunroof cassette
- Identify each of the three tracks and the components that belong in them
- Completely disassemble the front and rear glass mechanism

# Panorama Glass Sunroof Cassette Mechanism

## Component Identification

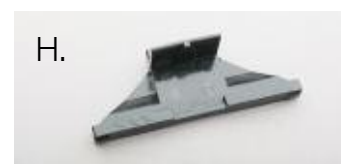
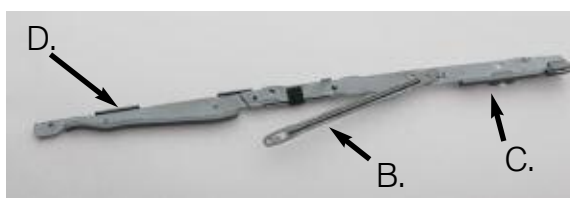
There are a number of components that make-up the Panorama Sunroof. To help organize them we will separate the cassette mechanism by tracks. There are 3 tracks that allow the glass mechanisms to operate.

- **Track 1** operates the main part of the front glass mechanism
- **Track 2** operates the front glass drive cable mechanism
- **Track 3** operates the rear glass mechanism and wind deflector mechanism



The components of Track 1 include:

- A. Cover strip
- B. Connection link
- C. Tilting Mechanism- Front
- D. Tilting Mechanism- Rear
- E. Driving Wedge
- F. Front Glass Panel Curve on Slider
- G. Front Drip Rail Carrier
- H. Sliding Element



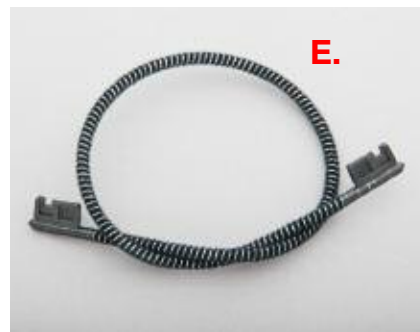
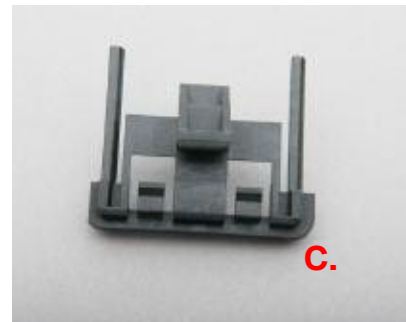
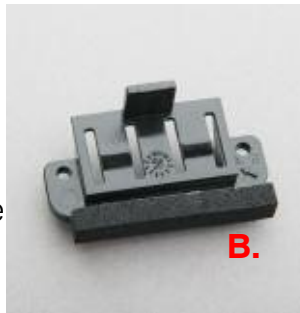
The components of Track 2 include:

- A. Drive Cable Plate with Cable
- B. Pivot Point for Wind Deflector



The components of Track 3 include:

- A. Rear Glass Tilt mechanism
- B. Spring Retainer\*
- C. Support for Drain Channel Rear\*
- D. Drive Cable Plate
- E. Rear Glass Drive Cable
- F. Rear Wedge
- G. Wind Deflector Control Carriage (two versions)
- H. Retaining Spring for Wind Deflector
- I. Spring attachment Point for Spring for Wind Deflector\*







# Sunroof Disassembly

Knowing the names and position of the parts on the Panorama Glass Sunroof will aid greatly in the disassembly and reassembly process as well as the inspection of the components.

## Disassembly Instructions

### Front Glass Panel Mechanism Removal

The following instructions demonstrate the removal of the Front Glass Mechanism of the cassette (Track 1 & 2) on a cassette from an E83 (X3). These instructions are a supplement to Repair Instruction REP 54 10 020 which are available on ISTA.

These instructions display the procedure on the LH side of the sunroof. The RH side is a mirror image of the LH side and the repair is carried out the same way.

Regardless of which side has failed, both the LH and RH side mechanisms should be replaced. The drain channels and the front motor must be removed prior to performing this procedure.

**Note: The procedure begins with the sunroof already removed from the vehicle and the glass panels removed.**

#### ■ Remove Cover Strip

Use a small flat head screwdriver to bend back the three retaining tabs and pull the cover strip upward to remove.

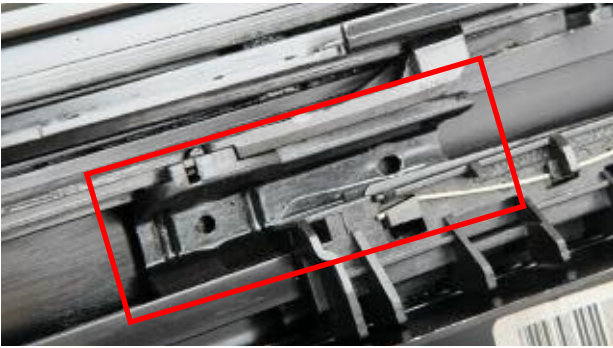
**Note: Do not damage the tabs, as the cover strips will be reused.**



### ■ Remove Front Glass Panel Mechanical Arm

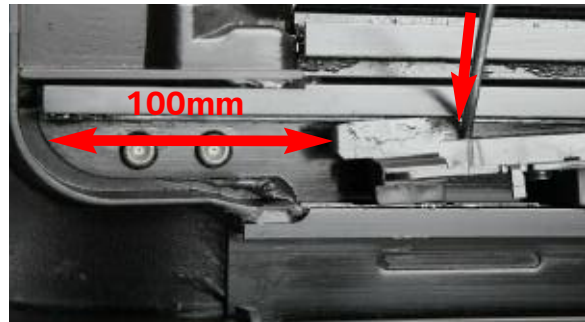
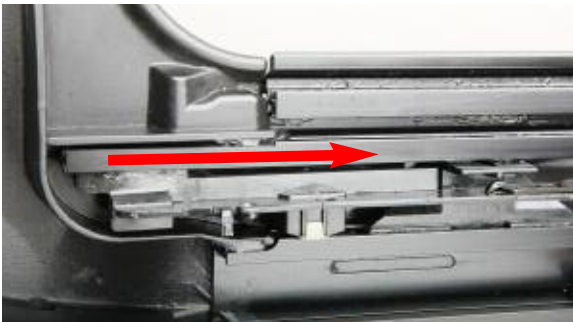
Start by pushing the drive cable plate, located in track 2, by inserting a flat blade screwdriver into one of the two hole in the plate. Push the plate rearward approximately 100mm (4").

Sliding the drive cable plate rearward will make the front glass tilt mechanism drop down and then slide rearward.



With the cable drive plate slide back 100mm, place the screwdriver behind the front slider of the tilt mechanism and gently pry this part out of the track.

**Note: The complete tilt mechanism cannot be removed yet.**



Push the drive cable plate forward with the screw driver until it stops at the wind deflector pivot . When the drive cable plate is all the way forward the drive wedge will have pushed the tilt mechanism fully upward.





**■ Remove Drip Rail Carrier**

Lift the locking lever of the carrier up out of the notch in the frame with a flat blade screwdriver. While lifting the lever push the carrier rearward until the driving wedge is at the end of the slider. Lift the driving wedge up.



With the driving wedge up, slide the drip rail carrier rearward all the way to the end and out of the track.



**NOTES:**


■ **Remove Sliding Element**

With the drip rail carrier removed, the sliding element can now be removed by sliding it to the end and out of the track.



■ **Remove Drive Wedge**

Rotate the drive wedge to the vertical position. With the drive wedge in the vertical position push the wedge toward the outside of the cassette away from the drive cable plate until it releases.



**NOTES:**




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### Remove Rear Glass Mechanism

The following instructions demonstrate the removal of the Rear Glass Mechanism of the cassette (Track 3) on a cassette from an E83 (X3). These instructions are a supplement to Repair Instruction REP 54 10 030 which are available on ISTA.

These instructions display the procedure on the LH side of the sunroof. The RH side is a mirror image of the LH side and the repair is carried out the same way.

Regardless of which side has failed, both the LH and RH side mechanisms should be replaced. The drain channels and the front motor and front glass mechanism must be removed prior to performing this procedure.

### ■ Remove Rear Tilt Mechanism

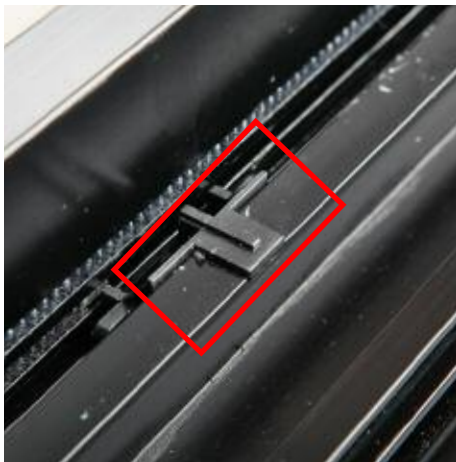
Using a flat blade screwdriver push the forward edge of the tilt mechanism toward the outside of the cassette. Lift the tilt mechanism upward and out of the track. Slide the tilt mechanism forward off the ramp and rotate it upward to release it from the cassette.



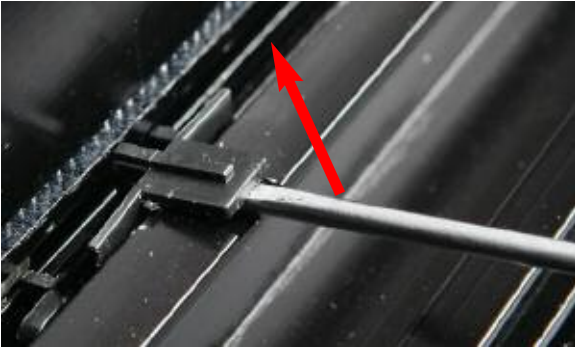
### ■ Remove Spring Retainer

**Note: Appropriate eye protection should be worn while performing these next steps!**

Insert a flat head screwdriver between the track and the retainer clip.

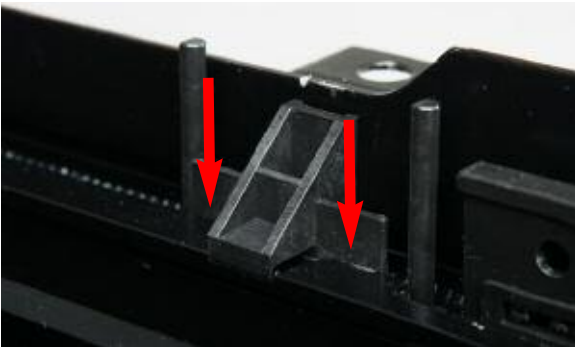


Lift the screwdriver up and the top of the clip will break off. With the top of the clip broken off, the retainer now slides freely in the track. The clip can be removed after their rear wedge has been slid out of the track.

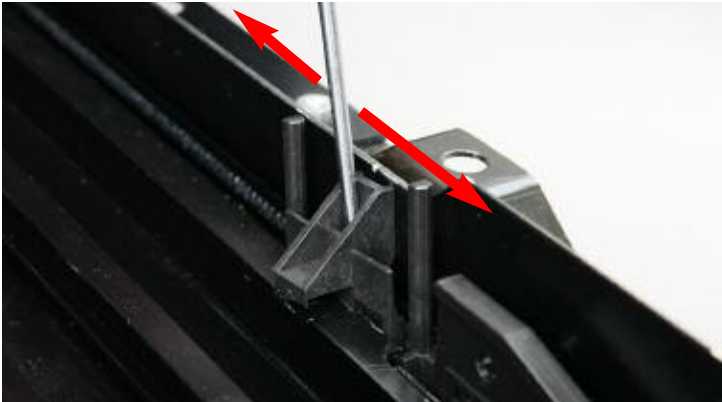


**Remove Support for the Rear Drain Channel**

Removing this part requires breaking off the attachment clips. Insert a flat blade screwdriver under the support piece and rotate it upward to break both clips.



After breaking the two clips, insert the screwdriver between the guide and the rear support drain channel and rotate it to lift the support out of the track. You can also insert the screwdriver into the clip from the top and rock it out of the track.







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### ■ Remove Rear Drive Cable Plate

While still keeping the rear drive cable plate lock released, push the plate rearward till the cable extends out of the track. Keep pushing the rear cable plate until it reaches the end of the track and push it inward toward the center of the cassette to remove it.



### ■ Remove Rear Glass Drive Cable

After the rear wedge and the rear drive cable plate have been removed, the rear glass drive cable can be pulled out of the track.

**Note: The rear glass drive cable runs in the upper track above the sunshade cable track. The rear glass drive cables are identical from right to left and are interchangeable.**



### Wind Deflector Mechanism

After removing both the front and rear glass mechanism the mechanism for the wind deflector can be removed.

**Note: To get the rear glass drive cable out on some models it may be necessary to unscrew and lift the rear cover plate.**



---

## ■ Remove Wind Deflector Pivot Point

**Note: It is not necessary to remove the wind deflector net from the front of the cassette.**

To remove the pivot point with the wind deflector arm is attached, insert a flat screw driver between the track and the inside edge of the pivot point. Rotate the screw driver to unclip the pivot point.



**Note: The wind deflector has been removed for clarity in the photos.**

The front edge of the pivot point is under the wind deflector control slide. Push the slide forward while lifting the pivot point up and out of the track.

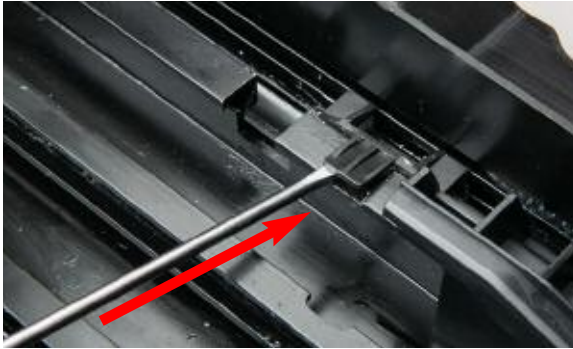
With the pivot point out of the track, rotate the pivot point 90° upward, in order to separate it from the wind deflector arm.



**■ Remove Wind Deflector Fixation Point Spring and Control Slide**

Unhook the wind deflector from the control slide by pulling the control slide forward, and the wind deflector arm down and inward. The control slide should moved freely back and forth in the track.

To remove the fixation point, insert a flat blade screw driver between the fixation point retaining tab and the notch in the track. Pry the retaining tab up and out of the notch.



Slide both the fixation point and the control slide to the end and out of the track.



**NOTES:**


# Sunroof Reassembly

Reassembly of sunroof is basically the reverse of the disassembly with on a couple differences. Installation of all the mechanisms is the same except for the installation of the support for the rear drain channel and the spring retainer are left for the very last step of reassembly.

## Reassembly Instructions

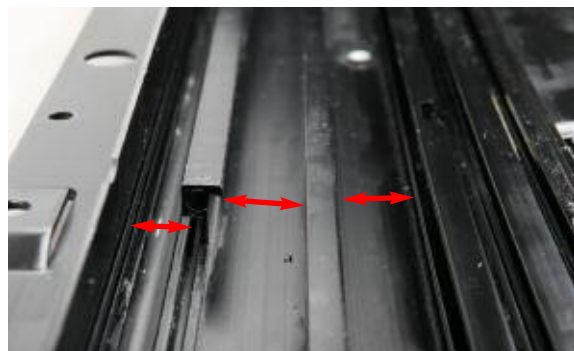
### Clean and Lubricate

Before beginning the reassembly process be sure to clean all of the tracks using a small brush to remove all dirt, dust, and any broken pieces from the removal process. Be sure to make sure all three (3) tracks are clean.

Any left over dust, dirt or broken parts could cause:

- Leakage, due to clogged drain system
- Leakage, due to restricted flow through drain system
- Squeaks and Rattles
- Functional problems
- Funtional failure

Make sure to lubricate with the recommended BMW grease specifically called out for the sunroof. Use a small brush to spread the grease evenly into the tracks. Grease only the surfaces where parts of the sunroof are pivoting, sliding, or turning. Do not use excessive amounts of grease and avoid getting grease in areas with no moving parts.



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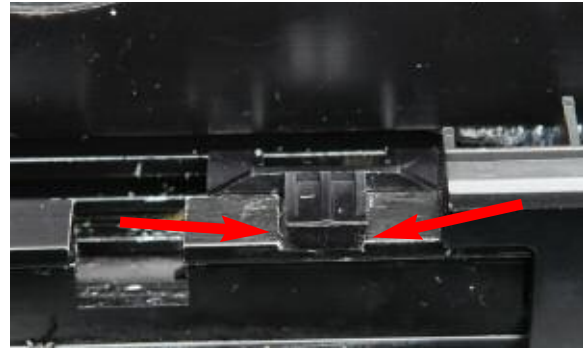
## Reinstalling Wind Deflector Mechanism

### Install Wind Deflector Fixation Point Spring and Wind Deflector Control Carriage

Start by attaching the spring from the carriage to the fixation point if not already attached from the repair kit. Install the carriage by sliding it into the track sideways and then sliding it forward along the track. While sliding the carriage forward hold the fixation point up and away from the track.



Once the wind deflector control carriage reaches the front of the track install the fixation point by pressing it into the notch in the track. Make sure that the plastic tab is fully seated in the notch before moving on.



### Install New Wind Deflector Pivot Point

Attach a new pivot point to the wind deflector by rotating it 90°, such that it hooks into place.

**Note: The longer side of the pivot point is the side that is clipped into the outer part of the frame, and the pointed end points forward.**



---

Line up the pivot point with the notch in the track and press it down to seat it in the track. Hook the control carriage to the wind deflector by pulling the carriage forward while pushing the wind deflector sideways and down putting it underneath the carriage. Ensure that the spring below the wind deflector arm is positioned correctly so that the wind deflector will raise up properly.

### **Install New Rear Glass Panel Mechanism**

After installing the new wind deflector components the rear glass mechanism components can be installed.

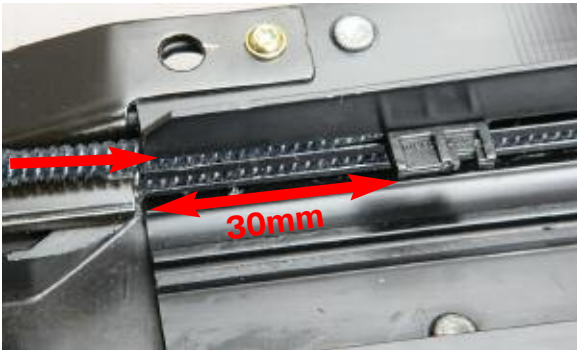
### **Install New Rear Glass Drive Cable**

Install the sunshade drive cable by lifting up the rear corner cover plate and inserting the cable into the lower track being careful not to kink the cable.



Insert the rear glass drive cable into the track above the sunshade drive cable. Only install the cable about 30mm into the track.

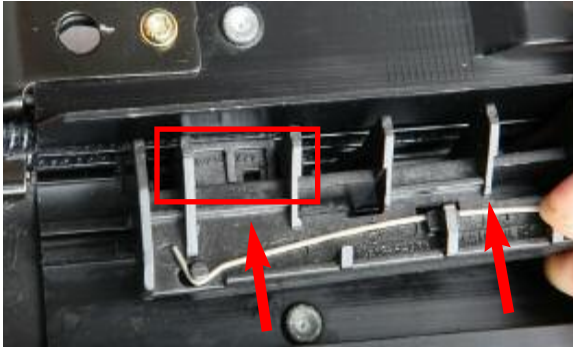
**Note: Some sunroofs require lifting up the rear corner cover to install the rear glass drive cable.**





### Install New Rear Drive Cable Plate

The rear drive cable plate has two cutouts for the retaining flag on the drive cable. The flag will only fit into the position shown. Fit the retaining flag of the cable into drive plate and slide them together into track 3 (outermost track). The locking lever of the drive plate must be held in the unlock position when sliding the assembly forward in the track.



Slide the drive cable plate with the cable forward until the rear retaining flag of the drive cable is approximately 30mm in the track. In this position the rear wedge can be pressed onto the retaining flag and into the track.



### NOTES:


### Install New Rear Wedge

Install the new rear wedge onto the rear retaining flag by lining it up and pressing the wedge onto the flag. Push the rear wedge and cable forward. Continue pushing the wedge forward until the lock of the rear drive cable plate locks into the notch in the track. Make sure the lock is fully engaged.

**Note: If the rear drive cable plate is not locked in place it can cause damage to the drive cable plate for the front glass mechanism.**



During the disassembly process we also removed the spring retainer and the rear drain channel support. Do not install these or the rear tilt mechanism at this time, it maybe necessary to disassemble and reassemble the rear mechanism which would require destroying these pieces.

### Installation of New Front Glass Mechanism

At this point move from the rear mechanism to the front mechanism installation. Installation of the spring retainer, rear drain channel support and the rear tilt mechanism will be after this procedure.

### Install New Drive Cable Plate with Cable

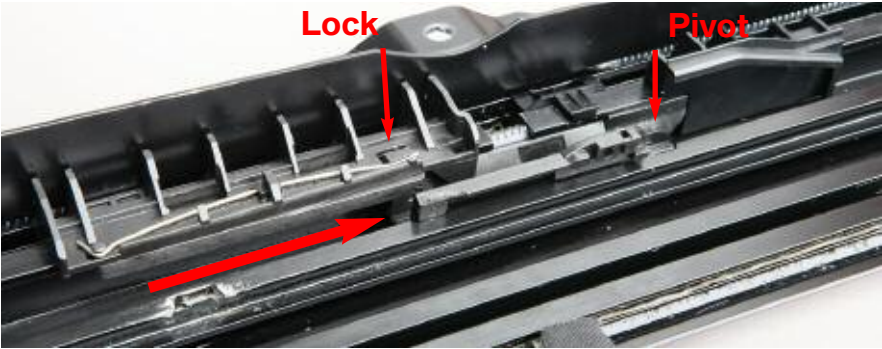
Insert the end of the new drive cable into the guide hole. Once the drive cable is almost fully inserted in the guide, slide the drive cable plate into track 2 (center track). Push the drive cable into the track until the drive cable plate is securely positioned in the track. The mounting hole for the wedge should be facing the inside of the cassette. Before continuing ensure that the rear drive cable plate is locked.



---

Push the drive cable plate forward using a screw driver until it is stopped by the wind deflector pivot point. When pushing the drive cable plate forward it will unlock the rear drive cable plate and move it forward.

**Note: The drive cable plate must slide all the way forward or subsequent installed parts will be damaged.**



**Install New Front Slide Element**

Insert the new front slide element into track 1 and slide it almost all the way to the front of the track. The element should be oriented such that the long side faces toward the outside of the cassette.

**Note: The slide element must move smoothly in the track without any noise or binding.**



### Install New Front Wedge

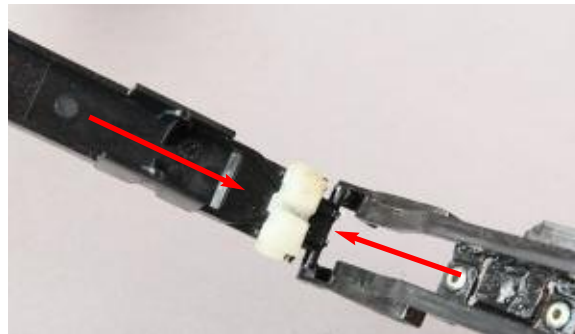
Position the wedge vertically against the hole in the cable plate and seat the wedge's pin completely into the cable plate. Lay the wedge down into the horizontal position pointing towards the rear of the cassette.

**Note: The pin on the wedge must be completely seated, or the cable plate will be damaged.**

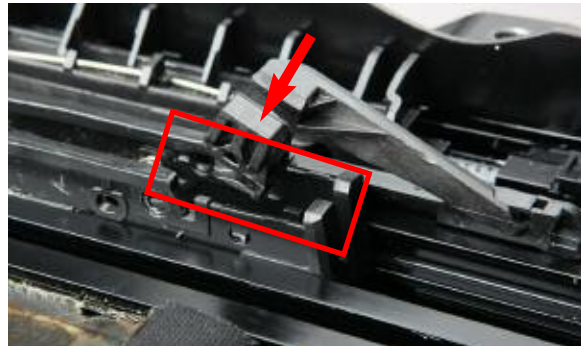


### Install New Drip Rail Carrier and Drain Channel Support

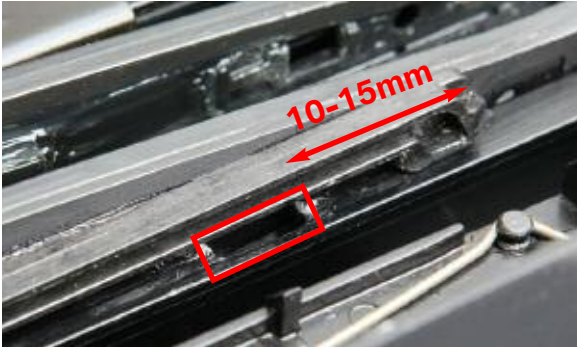
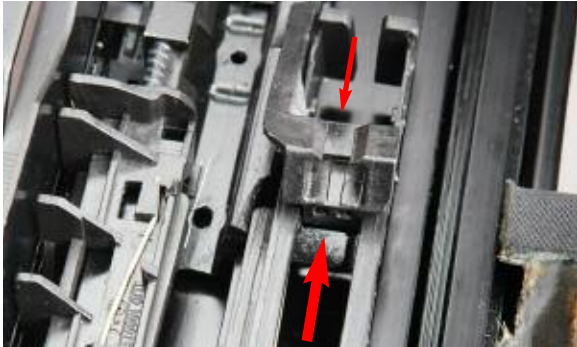
Connect the drip rail carrier and drain channel support together by aligning them at a 90° angle, align the two pins of the drip rail carrier into the end of the drain channel support as shown. Fold the drip rail carrier down so that the two parts lock together.



Slide the completed assembly into track 1 (innermost track). About 100mm into track 1 the lock must be lifted up in order to continue sliding the carrier. Push the carrier all the way forward until the front wedge is above the open area of the carrier as shown.



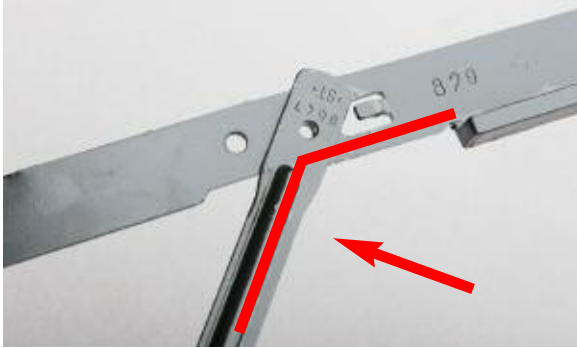
Press the front wedge down and into the open space of the drip rail carrier. Hold the wedge down and push the drip rail carrier forward. This will cause the front wedge to slide into the track on the carrier. Once the front wedge is engaged in the track on the carrier, slide the carrier until the lock lever is about 10-15mm from the notch in the track.



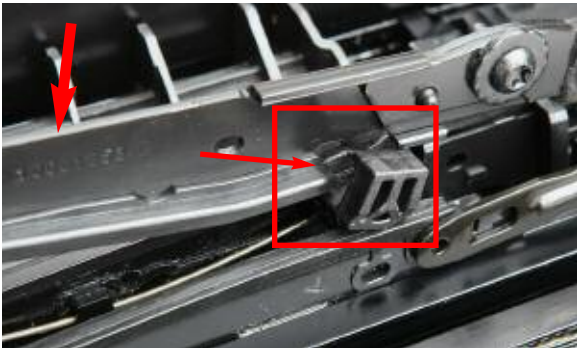
**Note: If the carrier slides too far forward and has locked in the cassette, unlock it and slide it back about 10-15mm.**

**Install New Front Glass Mechanical Arm and Connecting Link**

While holding the connecting link at a 90° angle to the front glass mechanical arm, position the connecting link into the hole in the mechanical arm near the hook. Rotate the link to secure it to the front mechanical arm. Holding the Mechanical arm and the connecting link, place the end of the link into the hole on the drip rail carrier, located on the front inside edge of the carrier.



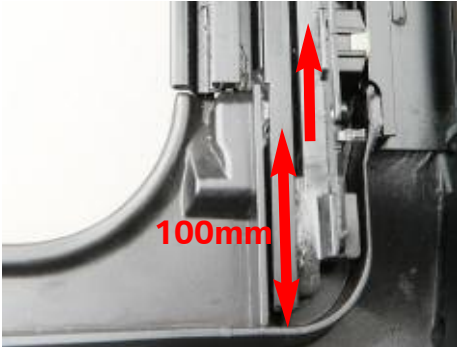
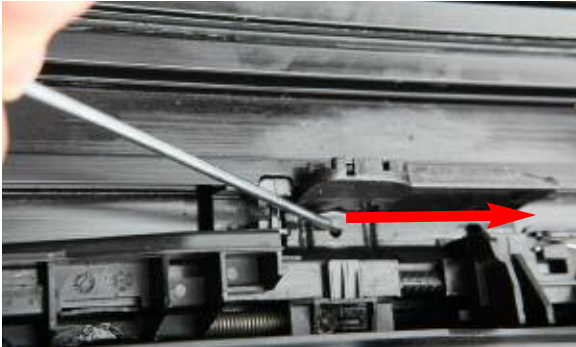
Lay the complete mechanical arm and connecting link down on the cassette. The ramp on the mechanical arm should be lined up behind the wedge.



With the end of slide on the mechanical arm lined up the front wedge, push the drip rail carrier forward until the locking lever locks into the notch in the track. The slide should now be engaged in the front wedge. Ensure that the connecting link is still properly installed.



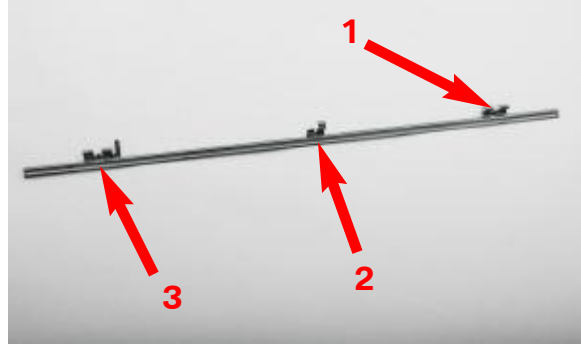
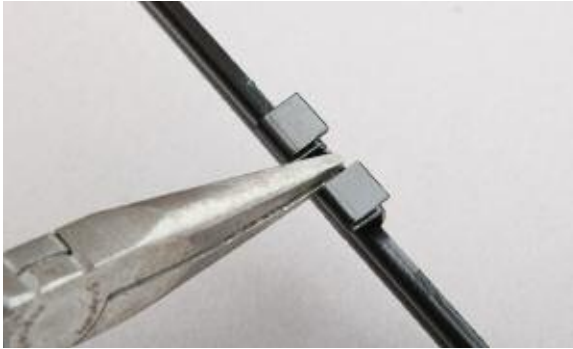
Push the complete mechanism rearward about 100mm using a flat blade screw driver on the front cable drive plate. As the mechanism moves the tilt mechanism will drop and then the glass panel mechanism will start sliding rearward. This will now put the front of the mechanical arm in position to be installed in the track. Push the front slider towards the outside of the cassette until it will drop into the track, once it drop into the track push it inward to engage it in the track.



Push the drive cable plate completely forward with a flat blade screw drive. This will cause the tilt mechanism to lift.

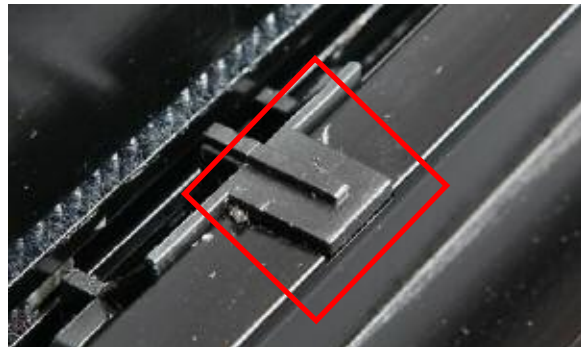
### Install Original Cover Strip

Using needle nose pliers bend all of the tabs of the original cover strip back into their estimated original position. Clip the cover strip on starting with the rear clip attaching to the front support drain channel, then the middle clip on the drip rail carrier and finally align the sliding element to the front clip. Gently pull up on the cover strip to ensure that it is properly seated.

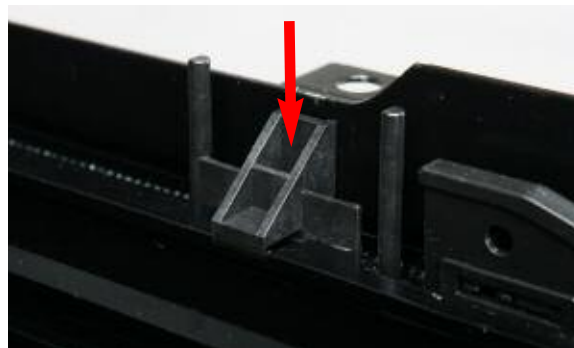


### Install New Spring Retainer and Rear Drain Channel Support

Press the spring retainer into position in track 3 (outer most track). There is a notch that the tab on the spring retainer fits into on the track. Ensure that the retainer is fully seated into the notch in the track.



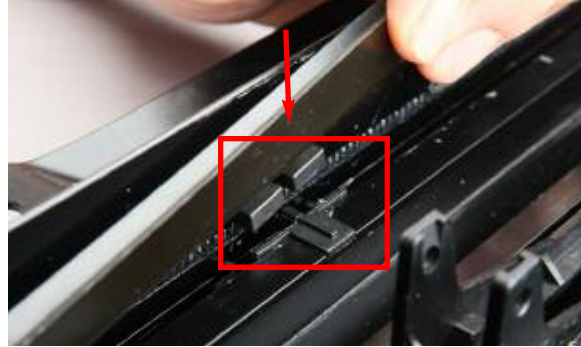
Press the rear drain channel support into position in track 3. This location also has notch in the frame that the support fits into behind the rear wedge. Ensure the support is fully seated into the notch in the track.



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### Install New Rear Glass Tilt Mechanism

Apply a lubricant such as Wurth Glide to the rear wedge of the rear glass tilt mechanism. Slide the tilt mechanism onto the rear wedge. Line up the slot in the middle of the tilt mechanism with the spring retainer seated in the track.



Now put the front end of the tilt mechanism into track 3 and push it all the way down into the track. Use a flat blade screw driver to push the front end of the mechanism sideways into the track.





## Timing Sunroof Mechanism

Timing the sunroof mechanism is the last step in reassembly of the sunroof, but is one of the most important steps.

**Note: The sunroof drive motor is still removed from the assembly!**

Ensure that both the front glass tilt mechanism arms are up in the vent/tilt position. If they are not use a flat blade screw driver to push both the drive plate cables fully forward. Place a small pin, punch or screw driver through the timing hole located at the rear of the front mechanical arm as shown. Push the drive cable plates rearward until the front wedge contacts the item coming through the timing hole. Ensure that this operation has been performed on both the right and left sides of the assembly and reinstall the drive motor.



**Note: Improper timing can cause noises, malfunctions, and possibly damage components of the drive mechanism. Be sure to operate the sunroof manually to ensure smooth operation before installing it in the vehicle and electrically operating it.**

## Sunshade Panel Mechanism

Removal of the sunshade panels does not require the sunroof cassette to be removed from the vehicle. If only the sunshades need to be replaced please reference repair instructions 54 13 070 on ISTA.

The following instructions demonstrate the removal and installation of the front and rear sunshade panels as well as the drive mechanism. The drive mechanism is located on the inner most track. This procedure requires the removal of the sunroof cassette from the vehicle.



## Removing Front and Rear Sunshades

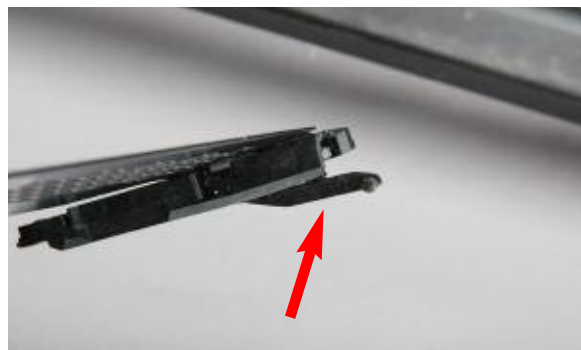
Unplug the wire harness from the rear motor and operate it manually to slide the shades all the way to the rearmost stacked position. Insert a small flat blade screw driver between the clip and the rear headliner driver.



With the screw driver between the clip and the driver insert a wedge under the clip and rotated it toward the center of the cassette to unlock it. Repeat this process on the opposite side.



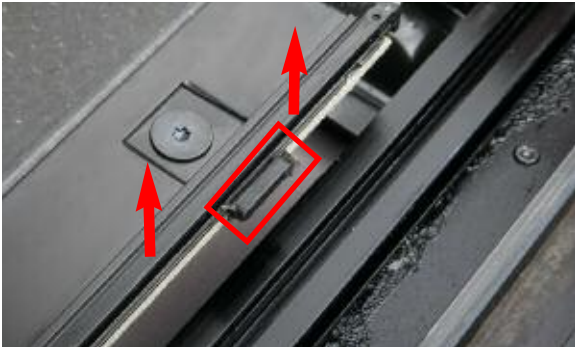
With the locking clips released, grab both sides of the fan plate by the drivers and pull it rearward and out of the cassette. Once removed inspect the rocker arms to ensure that they move easily and are not damaged. If damaged replace them.



Rotate the rear drive motor manually to move the shades forward. Continue sliding the front headliner until the two shades are separated by approximately 50mm. From the left side of the cassette grab the middle of the rear shade and pull it toward yourself. The panel will move slightly under spring pressure.



While pulling the rear shade to the left the sliders on the right side of the panel will be exposed. Lift the panel upward to remove it from the right side track. The left side can then be removed.



With the rear shade removed, rotate the drive motor till the front shade is the most rearward position. Remove the three T15 fasteners from both the left and right side cover plates.



**Note: When reinstalling panels be sure to observe proper torque on these particluar fasteners! (1.2Nm)**

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Lift up both cover plates and slide the sun shade rearward out of the cassette. Installation of the panels is the reverse of the removal process. Be sure to perform a manual function test before installing the sunroof cassette.

### Function Test

- Rotate the motor manually to run the panels through the full range of travel.
- Minimal resistance should be felt through the range of travel.
- The pick-up and drop-down of the rear sunshade panel must be smooth and quiet.
- Both rocker arms must pick-up the rear shade at the same time.
- The fan plate must sit parallel to the rear shade.
- After a successful test, install the cassette, plug in the motor and operate electrically.

### Sunshade Mechanism Removal

Start by removing the cover plates. If you are not replacing the cover plate insert a flat blade screw driver behind the clip fastener and lever it upward. If you are replacing the cover plate insert the screwdriver from the inside and break the clip cover off.

**Note: Be sure not to damage the aluminum cassette rails!**

Unhook the middle fastener of the cover plate by rotating the cover plate down and in towards inside of the cassette.



Rotate the rear edge of the cover plate toward the center of the cassette in order to unhook the front of the cover plate from the rail. Remove the opposite side in the same-manner.



Remove the rear drop box, which acts as the end stop for the inner-most rail, by bending the aluminum tap upward with a small screwdriver then pressing down and inward on the drop box. Do not bend the tabs more than 2mm.



Slide the rear slider out of the rail.

**Note: Take notice of the order and orientation of these components for the installation of the new parts.**

Remove the rear drive motor and removed drive cable cover plate.



Pull the outer headliner drive cables out of the channels. Pull the inner drive cable out. Using a small screw driver keep the locking mechanism from locking by inserting it in the notch in the track at the rear of the cassette.



Using a small screw driver remove the front sliders from the track.



### Sunshade Mechaism Installation

Start by sliding the new front sliders into the track and assembling the 2-piece locks as shown



Slide the assembled locks into the rails and open the lock into the notch in the track with a small screwdriver.



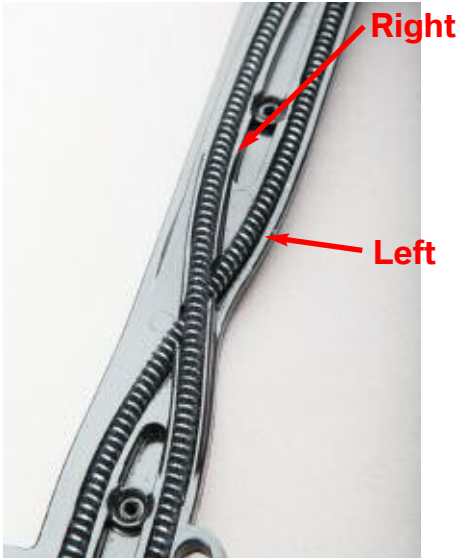
Slide the cable with the drive plate into the track. Stop sliding the cable 50-80mm after the locks are unlocked by the sliding cable. Slide the rear sliders into the rail. Both sliders should point toward the rear of the cassette.



Slide the headliner drive cable into the outer guide in the track.

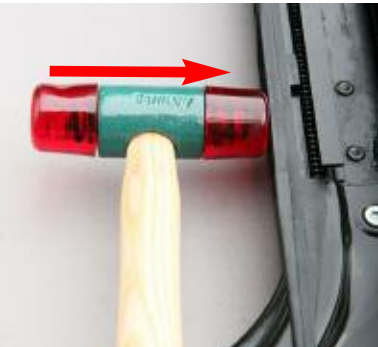


Lay the cables into the track where they will cross once. The left side cable will be below the right side cable. Install the cover plate over the crossed cables. The cables must remain seated in the tracks.





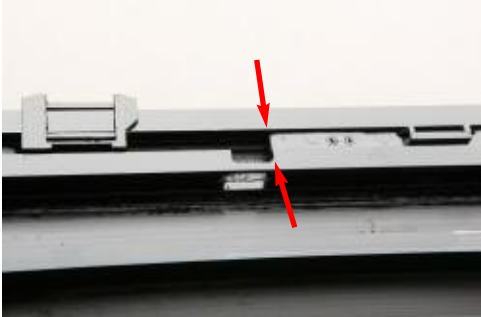
Install the new rear drop boxes (end caps) at the rear of the cassette. Position the drop box over the aluminum tab and tap it with a mallet to seat it on the tab. Push the drop box forward to ensure there is no gap between the drop box and the rail.



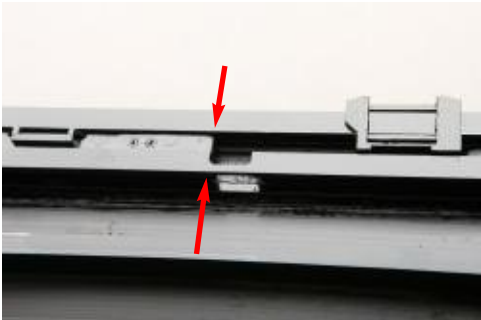
Insert a flat blade screw driver into the center of the retaining tab, and gently rotate it to tighten the tab.



Adjust the drive cables so that they are even from side to side. Line up the locks on both sides with the notch in the frame.



**Right Side**



**Left Side**

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With the sunshade mechanism timed correctly reinstall the sunshade motor and install the cover plates for the front sunshade in the reverse in which they were removed. Run the sunshade mechanism manually and move the front shade cover plates forward until they are ahead of the cassette support beam.

## Installation of Sunshades

Install the rear sunshade in the reverse of how it was removed. Take care to make sure none of the sliders fall off during installation. Once the rear shade is installed install the front shade under the cover plates and install screws. Operate the sunshade mechanism manually, running the front shade rearward until it is 100mm from the end of the track. Install the vent plate, sliding it into the sunshade track. Make sure the rocker arm gets installed correctly into the track on the rear sunshade.



Make sure the vent plate is engaged in the cover plate mechanisms and close the clip onto the fan plate locking it to the mechanism. Run the sunshade mechanism manually to ensure proper function!

# Reference

## Service Information Bulletins and Repair Instructions

Since the introduction of the Panorama Glass Sunroof there have been a number of documented issues. These issues were researched and repairs were developed and are outlined in Service Information Bulletins (SIB). The list below represents the current bulletins available for the E70, E53, E83, E61, and E91.

### SIB's

- 54 50 02 - February 2002 Wind Noise from Sunroof - E53
- 54 51 02 - June 2002 Wind Buffeting Noise with Sunroof Opened and Windows Closed - E53
- 54 01 04 - February 2004 Service Action: Recode Panorama Sunroof - E83
- 54 02 05 - July 2005 Panoramic Sunroof will not close from Vent Position - E53, E83
- 54 05 05 - July 2005 Panoramic Sunroof Gurgling Noise - E83
- 54 06 06 - October 2009 Water Leak from Panoramic Sunroof - E53, E61, E70, E83
- 54 14 06 - October 2008 Panorama Sunroof Sunshade Noise - E83
- 54 04 07 - April 2007 Sunroof will not Close from Tilt Position - E70
- 54 07 07 - May 2007 Wind Deflector Broken - E70
- 54 01 08 - January 2008 Wind Noise from the Panoramic Sunroof - E61, E83, E91
- 54 05 08 - March 2008 Rattle from Panoramic Roof When Fully Open - E83
- 54 06 08 - May 2008 Clicking Noise From Sunroof - E70
- 54 08 08 - November 2009 Sunroof's Rear Glass Panel Does Not Close from the Vent Position -E70
- 54 11 08 - August 2009 TeileClearing for Panoramic Roof - E53, E61, E70, E83, E91
- 54 12 08 - October 2009 Water Leak from the Front of the Sunroof - E70, E71
- 54 15 08 - November 2008 Panoramic Sunroof Repairs - E53, E61, E70, E83, E91
- 54 04 09 - March 2010 Wind Noise or Water Leak from the Sunroof - E53, E60, E61, E65, E66, E70, E71, E83, E91, F01, F02
- 54 07 09 - July 2009 Squeaking Noise from the Sliding Headliner - E53, E61, E83, E91

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- 54 13 09 - February 2010 Panoramic Sunroof Repair Instructions - E53, E61, E70, E83, E91
  - 54 01 10 - February 2010 Rear Glass Mechanism Repair Kit - E70
  - 54 02 10 - February 2010 Replacing the Sunroof Glass Mechanism - E53, E61, E83

### **Repair Instructions from ISTA**

All of the repair instructions in this manual act as a supplement to the repair instructions available via ISTA. Always refer to ISTA for the most current information. All repair instructions for the different sunroof assemblies by make and model can be found under group 54 "Special Roofs".

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NOTES

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